





Operator	Rank		
a*b			
a+b			
a-b			
a.*b			
a.^b			
a./b			
a.\b			
a⇒≕b			
a‴=b			
a <b< td=""><td><math>\max(R(a),R(b))</math></td></b<>	$\max(R(a),R(b))$		
a>b .			
a<=b			
a>=b			
a&b			
alb			
a/b			
a\b			
[a, b]			
[a; b]			
+a			
-a ~-	D(a)		
~a.	R(a)		
a.,			
c(:) ← a	R(c)		
a*b	10(0)		
a(:)	2		
rand	_		
a:b			
rand(a, b)	2		
ones(a, b)			
a(e)	R(e)		
$a(e_1,e_2,\ldots,e_n)$			
$rand(e_1, e_2, \ldots, e_n)$	n		
ones $(e_1, e_2, \ldots, e_n)$			
c(e) ← a	$\max(R(a),R(c))$		
$c(e_1,e_2,\ldots,e_n) \leftarrow \mathbf{a}$	$\max(n, R(c))$		

FIG. 4

·MATLAB	Shape		u .	
Expression	Expression	$\overline{ heta}(e)$		
· e				
a*b	s⊕t	$egin{aligned} & \overline{ heta}(a)\overline{ heta}(b)(1-(1-\overline{lpha}(a))\ & (1-\overline{lpha}(b))(1-\overline{eta}(a)\overline{eta}(b)\ & \delta(\Psi s \Psi \Gamma_1 - t \Gamma_1))) \end{aligned}$	$(1-\overline{\theta}(e))\pi^* + \overline{\theta}(e)(s^*\overline{\alpha}(b) + t^*\overline{\alpha}(a)(1-\overline{\alpha}(b)) + (s^*\Gamma_1 + t^*\Gamma_2 + \mathbf{I} - \Gamma_1 - \Gamma_2)(1-\overline{\alpha}(a)) $ $(1-\overline{\alpha}(b)))$	
a+b a-b a.*b a.*b a./b a.\b a==b a~=b a <b a="">&gt;b a&gt;=b a&gt;=b a&gt;=b</b>	s⊕ <b>t</b>	$\overline{ heta}(a)\overline{ heta}(b)(1-(1-\overline{lpha}(a))\ (1-\overline{lpha}(b))(1-\delta(s-t)))$	$egin{aligned} &(1-\overline{ heta}(e))\pi^*+\overline{ heta}(e)(s^*\overline{lpha}(b)+\ &t^*(1-\overline{lpha}(b))) \end{aligned}$	
ta a a	រិន	$\overline{ heta}(a)$	s*	
a~b	s⊙t	$egin{aligned} & \overline{ heta}(a)\overline{ heta}(b)(1-(1-\overline{lpha}(a)\overline{eta}(b)) \ & \delta(t\Gamma_1-\Psi t\Psi\Gamma_1)) \ & (1-\overline{lpha}(b)\overline{eta}(a)\delta(s\Gamma_1-\Psi s\Psi\Gamma_1))) \end{aligned}$	$(1-\overline{ heta}(e))\pi^*+\overline{ heta}(e) \ (s^*\overline{lpha}(b)+t^*(1-\overline{lpha}(b)))$	
a.,	- 8	$\overline{eta}(a)$	$(1-\overline{ heta}(e))\pi^*+\overline{ heta}(e)\Psi s^*\Psi$	
a/b	$s\dot{\oslash}t$	$\overline{ heta}(a)\overline{ heta}(b)(1-\overline{lpha}(b))(1-\overline{lpha}(a)) \ (1-\overline{eta}(b)))(1-\overline{eta}(a)\overline{eta}(b)) \ \delta(s\Gamma_2-t\Gamma_2)$	$(1-\overline{ heta}(e))\pi^*+\overline{ heta}(e)(s^*\overline{lpha}(b)+ \ t^*(1-eta(b))+(s^*\Gamma_1+\mathbf{I}- \ \Gamma_1-\Gamma_2+\Psi t^*\Psi \Gamma_2)(1-\overline{lpha}(b))eta(b)$	
a\b	sõt	$ \overline{\theta}(a)\overline{\theta}(b)(1-\overline{\alpha}(a))(1-\overline{\alpha}(b) $ $ (1-\overline{\beta}(a)))(1-\overline{\beta}(a)\overline{\beta}(b) $ $ \delta(s\Gamma_1-t\Gamma_1) $	$(1-\overline{\theta}(e))\pi^* + \overline{\theta}(e)(t^*\overline{\alpha}(a) + s^*(1-\beta(a)) + (\Psi s^*\Psi\Gamma_1 + \mathbf{I} - \Gamma_1 - \Gamma_2 + t^*\Gamma_2)(1-\overline{\alpha}(a))\beta(a)$	
[a; b]	$s\dot{\circledcirc}t$	$\overline{ heta}(a)\overline{ heta}(b)\delta(s(\mathbf{I}-\Gamma_1)-t(\mathbf{I}-\Gamma_1))$	$\frac{(1-\overline{\theta}(e))\pi^*+\overline{\theta}(e)}{(s^*+t^*\Gamma_1)}$	
[a, b]	s⊖t	$\overline{ heta}(a)\overline{ heta}(b)\delta(s(\mathbf{I}-\Gamma_2)-t(\mathbf{I}-\Gamma_2))$	$(1-\overline{ heta}(e))\pi^*+\overline{ heta}(e) \ (s^*\Gamma_2+t^*)$	

FIG. 5

Shape-Tuple Class Operator	Identity	Associativity	Commutativity	Idempotent Law
●	i	×	×	×
<b>⊕</b>	i	<b>√</b>	V	€.
}	_	-	-	- `
0	i	1	1	
	-		-	_
0	X	X	X	X
٥	×	×	X	X
0	X	1	1.	X
$\Theta$	X	✓	1	X

FIG. 6